

I Claim:

- Sub B1
1. A test method for measuring the low spatial
uniformity of a DMD, comprising the steps of:
5 building a reference surface correction image;
capturing a test image;
correcting said test image to remove DMD mirror tilt
angle non-uniformities from said test image;
further correcting said test image to remove system
10 illumination and optics non-uniformities from said
test image;
multiplying said test image by said correction
reference image to produce a low spatial uniformity
result image; and
15 extracting low frequency non-uniformity defect data
from the result image.
 2. The test method of Claim 1 wherein said reference
surface correction image is formed by means of a
20 light mapping process, comprising the steps of:
stepping a small 50x50 pixel region of DMD mirrors
having constant reflectivity from point to point in
a grid pattern over the field of view of the test
DMD;
25 recording the intensity data at each of said points
in said grid pattern; and

performing a bi-directional interpolation between
said grid points in two dimensions over image to
provide said reference surface correction image.

- 5 3. The test method of Claim 1 wherein test image is
prepared by means of:

capturing said test image in smaller frames;

removing high spatial non-uniformity components

using a 21x21 pixel smoothing filter;

- 10 stitching said frames together to form a full size
test image; and

taking average of said frames to remove said
stitched image boundary discontinuities.

- 15 4. The test method of Claim 1 wherein said result image
is obtained for:

+20° illumination relative to 0° DMD mirror tilt
angle; and

- 20 -20° illumination relative to 0° DMD mirror tilt
angle.

5. The test method of Claim 4 wherein said result image
isolates and extracts:

high spatial frequency defects;

- 25 stitched frame boundary discontinuities;

DMD mirror tilt angle non-uniformities; and

low frequency illumination source and optics non-uniformities.

6. The test method of Claim 4 wherein:

5 said result image is flattened;
said result image consists essentially of data representing the DMD mirror reflectivity non-uniformities.

10 7. A test method for measuring the low spatial uniformity of a DMD, comprising the steps of:
capturing a test image;
developing a correction reference surface image which conforms to the average surface of said test
15 image;
developing a gain factor correction image;
multiplying said test image by said gain factor correction image to provide a flattened low spatial uniformity result image; and
20 extracting the low frequency non-uniformity defect data from said result image.

8. The test method of Claim 7 wherein test image is prepared by means of:
capturing said test image in smaller frames;
25 removing high spatial non-uniformity components.
using a 21x21 pixel smoothing filter;

stitching said frames together to form a full size
test image; and
taking average of said frames to remove said
stitched image boundary discontinuities.

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9. The test method of Claim 7 wherein said result image
is obtained for:

+20° illumination relative to 0° DMD mirror tilt
angle; and

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-20° illumination relative to 0° DMD mirror tilt
angle.

10. The test method of Claim 7 wherein said correction
reference surface is formed by means of:

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performing a 3x3 pixel lowpass filtering of said
test image;

sub-sampling of said filtered image to provide a
representative image having fewer rows and columns;
using said representative image data to generate a

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set of 2nd order equations; and
using said equations to generate a reference surface
having only 2nd order variations.

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11. The test method of Claim 10 wherein said gain factor
correction image is formed from said reference
surface data; such that

a flatten image plane results when said reference surface data is multiplied by said gain factor correction image data.

5 12. The test method of Claim 11 wherein said result image isolates and extracts:
high spatial frequency defects;
stitched frame boundary discontinuities;
DMD mirror tilt angle non-uniformities; and
10 low frequency illumination source and optics non-uniformities.

13. The test method of Claim 12 wherein:
said result image is flattened;
15 said result image consists essentially of data representing the DMD mirror reflectivity non-uniformities.

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